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22879 7590 09/18/2008 HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			EXAMINER YAARY, MICHAEL D	
			ART UNIT 2193	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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DETAILED ACTION

1. Claims 1-23 are pending in the application.

Claim Objections

2. Claim 21 objected to because of the following informalities: It is suggested, for consistency, that limitations of (b), (d), and (e) be written in similar format to that of (a).

Example: (a) discloses a "repository of magic numbers." Thus, in (b) "template repository" should be changed to a repository of templates. In (d) "template filler routines repository" should be changed to a repository of template filler routines. In (e) "minimal decode/magic-number-routines repository" should be changed to a repository of minimal decode/magic-number routines. Appropriate correction is required.

3. Claim 22 objected to because of the following informalities: The preamble should be corrected to read "A process of operating the dynamic translator..." Appropriate correction is required.

4. Claim 23 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It is unclear as to how claim 23 is further limiting and appears that the claim's intent is to be of independent form.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. As to claims 8-14, 16, 17, 19, and 20, the claims are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

(i) Claims 8, 16, and 20 are directed to software per se, not tangibly embodied, the claims being directed to an apparatus, where the limitations (instruction analyzer, dependency identifier, binary code translator), fail to recite any hardware to execute the claimed computer instructions. The claims provide no such specific hardware or structural elements showing that the claimed limitations are not necessarily software.

(ii) Claims 9-14, 17, 19 and 20 are rejected for similar reasons as discussed for their respective parent claims, as they fail to present any limitations that resolve the deficiencies of the claim from which they depend.

(iii) Claim 21 is directed to method claim. However, the claim lacks either 1) being tied to another statutory class (such as a particular apparatus) or 2) transforming underlying subject matter to a different state or thing (In re Bilski). Thus, the method claim is directed to non-statutory subject matter.

(iv) Claims 22 and 23 are rejected for similar reasons as discussed for their respective parent claims, as they fail to present any limitations that resolve the deficiencies of the claims from which they depend.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-4, 7-11, and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hughes et al. (hereafter Hughes)(US Pat. 6,519,768) in view of Bharadwaj (US Pat. 5,894,576).

9. Hughes and Bharadwaj were cited in the previous office action dated 02/05/2008.

10. **As to claims 1 and 8**, Hughes discloses a method of execution of binary code translated from a source format to a target format, wherein the source format differs from the target format, (abstract) said method comprising the steps of:

identifying a set of target instructions semantically equivalent to a given source instruction (Column 2, lines 5-8 disclose utilizing a template and applying it to block of target instructions corresponding to a particular source code instruction, and doing so for each source code instruction; thus identifying semantically equivalent target and source instructions.); and

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Assigning an identifier to one or more of said target instructions for use by a code analyzer in processing of said set of target instructions (column 3, lines 57-65).

11. Hughes does not disclose the method is for code scheduling; identifying data dependencies in said target instruction by analyzing the set of target instructions and the identifier assigning is done in scheduling in accordance with the identified data dependencies.

However, in an analogous art, Bharadwaj discloses the method is for code scheduling; identifying data dependencies in said target instruction by analyzing the set of target instructions and the identifier assigning is done in scheduling in accordance with the identified data dependencies (column 1, lines 13-35 and column 6, lines 57-64 disclose analyzing for data dependencies in the instructions; and thus combined with Hughes would allow for identifiers to be assigned based on the identified data dependencies.).

12. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Hughes, by identifying data dependencies, as taught by Bharadwaj, in order to increase the overall efficiency of translating code, as one would be motivated to make the combination for the benefit of reducing the number of execution cycles needed as a result.

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13. **As to claims 2 and 9**, the combination of Hughes and Bharadwaj disclose the set of target instructions is identified in a translation template associated with a given source instruction, said template being a component of a translator program for translating instructions in the source format into instructions in the target format (Hughes, column 1, line 55-column 2, line 19 and column 2, line 66-column 3, line 8).

14. **As to claims 3 and 10**, the combination of Hughes and Bharadwaj disclose the analysis of the target instructions is carried out prior to the compilation of the translation templates into said translator program (Hughes, abstract lines 2-4 and column 2, line 66-column 3, line 8.).

15. **As to claims 4 and 11**, the combination of Hughes and Bharadwaj disclose the identifiers are assigned to said target instructions prior to said translator program being compiled (Hughes, column 3, line 57-column 4, line 5).

16. **As to claims 7 and 14**, the combination of Hughes and Bharadwaj disclose a plurality of said translation templates, each translation template is associated with a corresponding analysis routine that generates said code for scheduling the execution of said translated code (Hughes, column 2, line 66-column 3, line 65, disclose a system for analyzing templates for adding or removing functions, thus resulting in a set of binary templates used in the code translation process; thus being analogous to the analysis routine used to in the template analyzing of the instant claims.

17. **As to claim 15**, the combination of Hughes and Bharadwaj disclose a computer readable medium or storage device storing indicia for causing a data processor arrangement to perform the method of claim 1 (Inherent Hughes, column 1, line 49-column 2, line 20 as some sort of software implemented computer program would be needed to perform the method.).

18. **As to claim 16**, Hughes discloses a binary code translator for translating binary code from a source format to a target format for execution on a target processor (abstract), the translator comprising a computer-readable medium or storing device storing coded indicia adapted to be read by a data processor arrangement, the coded indicia including:

A set of translation templates (column 1, line 55-column 2, line 19 and column 2, line 66-column 3, line 8), each template arranged for providing a set of target format instruction which together are semantically equivalent to an associated source format instruction (Column 2, lines 5-8 disclose utilizing a template and applying it to block of target instructions corresponding to a particular source code instruction, and doing so for each source code instruction; thus identifying semantically equivalent target and source instructions.);

A set of transformation routines arranged to transform data from a source format instruction into the appropriate parts of each target format instruction provided by the corresponding translation template (Column 3, line 65-column 4, line 5 disclose utilizing

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the translation templates to perform a translation process (transformation routine), to transform the data of a source format into a target format).

19. Hughes does not disclose a set of analysis routines arranged to identify data dependencies in a template for causing generation of data for use by a code scheduler in scheduling the execution of translated code on said target processor.

However, Bharadwaj discloses a set of analysis routines arranged to identify data dependencies in a template for causing generation of data for use by a code scheduler in scheduling the execution of translated code on said target processor (Column 6, lines 57-64 disclose analyzing for data dependencies in the instructions using a data dependence analyzer. Bharadwaj does not explicitly recite analysis routines used in identifying data dependencies; however, this would nonetheless be obvious in that the data dependence analyzer would utilize certain routines in order to identify data dependencies.).

20. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Hughes, by identifying data dependencies, as taught by Bharadwaj, in order to increase the overall efficiency of translating code, as one would be motivated to make the combination for the benefit of reducing the number of execution cycles needed as a result.

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21. **As to claim 17**, the combination of Hughes and Bharadwaj disclose the binary code translator arranged to operate dynamically at run time of an application program being emulated (Hughes, column 3, line 66-column 4, line 5).

22. **As to claims 18 and 19**, the combination of Hughes and Bharadwaj disclose the code analyzer schedules the processing of said set of target instructions in accordance with the identified data dependencies (Bharadwaj, column 4, line 61-column 5, line 14 and column 6, lines 57-64).

22. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hughes in view of Bharadwaj as applied to claims 1 and 8 above, and further in view of Mochizuki (US Pat. 6,016,396).

23. Mochizuki was cited in the previous action dated 02/05/2008.

24. **As to claims 5 and 12**, the combination of Hughes and Bharadwaj disclose the limitations of the claims with respect to independent claims 1 and 8 above, but is silent to processing the translated code in a parallel processing environment.

However, in an analogous art, Mochizuki discloses a code conversion system operating in a parallel processing environment (column 1, lines 7-12).

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25. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the code scheduling and translation method of the combination of Hughes and Bharadwaj, by utilizing a parallel processing environment, as taught by Mochizuki, in order to simultaneously execute multiple code translations. One would be motivated to make the combination as a high speed processing system would be maintained.

26. Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hughes in view of Bharadwaj as applied to claims 1 and 8 above, and further in view of Rasbold et al (hereafter Rasbold)(US Pat. 5,202,975).

27. Rasbold was cited in the previous action dated 02/05/2008.

28. **As to claims 6 and 13**, the combination of Hughes and Bharadwaj disclose the limitations of the claims with respect to independent claims 1 and 8 above, but is silent to data dependencies are represented by a directed acyclic graph, and the identifying step identifies said dependency signaling an appropriate edge in the set of target instructions to said code analyzer.

However, in an analogous art, Rasbold discloses data dependencies are represented by a directed acyclic graph, and the identifying step identifies said dependency signaling an appropriate edge in the set of target instructions to said code

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analyzer (Column 9, lines 11-29 disclose a dependency DAG utilizing edges indicating dependencies between code.).

29. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Hughes and Bharadwaj, by utilizing a directed acyclic graph, as taught by Rasbold, in order to effectively model the code to be scheduled and provide a partial ordering of the code as well.

30. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hughes.

31. **As to claim 20**, Hughes discloses an apparatus for translating machine instructions in source code into equivalent target instructions of a code of a target platform, wherein the source code differs from the code of the target platform (abstract), said apparatus comprising:

A source of binary translation templates for mapping instructions in the source code into a set of instructions in the code of the target platform (abstract and column 1, lines 55-58);

A dynamic binary translator arranged to be responsive to the machine instructions (column 3, lines 42-53).

32. Hughes does not explicitly disclose a fill and analysis routine generator arranged to be responsive to the templates for generating fill and analysis routines for identifying

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fillable positions in a template by parsing the template and for generating code to extract and deposit fields from the machine instructions in source code into a precompiled template.

However, Hughes discloses a system for analyzing templates for adding or removing functions, thus resulting in a set of binary templates used in the code translation process (column 2, line 66-column 3, line 65); thus being analogous to the fill and analysis routines used to in the template analyzing of the instant claim. Hughes does not explicitly teach parsing of the template, however, parsing is well-known knowledge in the art, and thus one of ordinary skill in the art at the time of the invention would have been able to utilize parsing in the template analyzing of Hughes, in order to further break down the code, as when parsed would provide code that can be interpreted more easily.

33. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the template analyzing process, as taught by Hughes, being analogous to the fill and analysis routines of the templates, for the benefit of creating a set of compiled templates that efficiently perform a translation process.

Response to Arguments

34. Applicant's arguments filed 06/05/2008 have been fully considered but they are not persuasive. Applicant argues that A) claims 8-14 and 16-20 are statutory under 35 U.S.C. 101; B) neither reference, Hughes or Bharadwaj, deals with the scheduling problem associated with claims 1 and 8; C) Hughes cannot make obvious the scheduling of the processing of the set of target instructions in accordance with the identified data dependencies; D) Hughes does not disclose to identify a set of target instructions semantically equivalent to a given source instruction; E) Bharadwaj is not analogous to the Hughes reference; F) Bharadwaj does not disclose identifying data dependencies in said target instructions by analyzing a set of target instructions; G) there is no motivation to modify Bharadwaj into Hughes; H) Bharadwaj does not teach the code analyzer schedules the processing of said set of target instructions in accordance with identified data dependencies; I) Bharadwaj does not identify data dependencies in a template for causing generation of data for use by a code scheduler in scheduling the execution of translated code on a target processor J) Hughes system for analyzing templates for adding or removing functions is not analogous to the claimed fill and analysis routines; and one of ordinary skill in the art would not have used parsing to break down code.

35. As to argument A) examiner respectfully disagrees. Applicant argues that claims 8-14 and 16-20 are directed to an apparatus; however, the claims provide no such

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specific hardware or structural elements showing that the claimed limitations are not necessarily software or fit in the statutory category of a system/machine since such is a physical entity.

36. As to argument B) examiner respectfully disagrees. Hughes is directed a system for translating source code instructions into target code instructions, utilizing binary codes and binary template sets, for execution on a processor. Bharadwaj discloses a system for instruction scheduling. Thus when taken in combination, Hughes and Bharadwaj teach scheduling problem associated with claims 1 and 8.

37. As to argument C) examiner respectfully disagrees. In response to applicant's argument that Hughes cannot make obvious the scheduling of the processing of the set of target instructions in accordance with the identified data dependencies, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, it is Bharadwaj that teaches identifying data dependencies and it is Bharadwaj that teaches the instruction scheduling. Thus, when the teachings of Bharadwaj are combined with the translating taught by Hughes, it is the combination that discloses the claimed limitations.

38. As to argument D) examiner respectfully disagrees. Applicant argues that Hughes does not disclose to identify a set of target instructions semantically equivalent to a given source instruction. Hughes does in fact disclose this limitation. Column 2, lines 5-8 disclose selecting an appropriate template for each instruction of the source code instructions. The template is further appended to the output block of corresponding target instructions during the translation of code. Furthermore, column 1, lines 21-29 disclose the translation of source code instructions into equivalent target code instructions. The claim provides no further limitations as to how the equivalent instructions are identified. Thus, when given the broadest reasonable interpretation the cited sections read on the instant claim. By appending a corresponding template to a source code instruction and appending the same corresponding template to a target code instruction it can be interpreted that the target and source code instructions are equivalent.

39. As to argument E) examiner respectfully disagrees. In response to applicant's argument that Hughes and Bharadwaj are nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both Hughes and Bharadwaj are in fact analogous. Hughes is directed a system for translating source

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code instructions into target code instructions for execution on a processor. Bharadwaj discloses a system for instruction scheduling. The scheduling of instructions further takes place in a system which translates code from one format to another (Bharadwaj, column 1, lines 13-36). Thus, both Hughes and Bharadwaj are indeed analogous art.

40. As to argument F) examiner respectfully disagrees. Bharadwaj does in fact disclose identifying data dependencies in said target instructions by analyzing a set of target instructions. The direct acyclic graph gives a hierarchy of data dependence in the instructions and data dependence information is stored in memory; thus showing the analyzing of target instructions to identify data dependencies (column 6, lines 57-64).

41. As to argument G) examiner respectfully disagrees. Applicant argues since “Bharadwaj is not concerned with translating code, one of ordinary skill in the art would not have modified Hughes et al. as a result of Bharadwaj.” Bharadwaj in fact is concerned with translating code, as disclosed in column 1, lines 13-36 and thus there would be motivation to make the combination. This motivation can be found in that the teachings of Bharadwaj would allow for more instructions to be executed in each clock cycle; enabling faster execution of the target code instructions and more efficient use of machine resources; and increase overall efficiency of the target code (Bharadwaj, column 1, lines 29-36 and column 2, lines 27-39).

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42. As to argument H) examiner respectfully disagrees. Bharadwaj does teach the code analyzer schedules the processing of said set of target instructions in accordance with identified data dependencies. Column 6, lines 57-64 disclose identifying data dependencies as discussed above; and column 4, line 61-column 5, line 14 further disclose an instruction scheduler. The scheduler further includes information from the data dependence analyzer and thus providing processing in accordance with identified data dependencies.

43. As to argument I) examiner respectfully disagrees. As discussed above in argument F, Bharadwaj does in fact disclose identifying data dependencies. Furthermore, Bharadwaj discloses a scheduler for scheduling the execution of translated code on a target processor as discussed above. When taken in combination with the translating process utilizing templates of Hughes, the combination reads on the instant claim.

44. As to claim J) examiner respectfully disagrees. Hughes system for analyzing templates for adding or removing functions is analogous to the claimed fill and analysis routines; and one of ordinary skill in the art would have used parsing to break down code. The analysis of Hughes, column 2, line 66-column 3, line 65 provides template analysis in the code translation in order to provide appropriate templates in the translation process; thus being analogous to the claimed fill and analysis routines. Furthermore, the utilization of parsing is well-known to one of ordinary skill in the art of

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code or instruction analysis; and thus would still be obvious to one of ordinary skill in the art when used in the translation of source code to target code. An example showing that parsing is well-known knowledge can be found in Bharadwaj, column 3, line 65-column 4, line 20. Here source code is parsed by a code generator. Thus one of ordinary skill in the art would use the well-known knowledge of parsing and apply it to the templates when taking in combination the teachings of Hughes and Bharadwaj.

Allowable Subject Matter

45. Claims 21-23 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 101 and the claim objections, set forth in this Office action.

Conclusion

46. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL YAARY whose telephone number is (571)270-1249. The examiner can normally be reached on Monday-Friday, 8:00 a.m - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis Bullock can be reached on (571) 272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. Y./

Examiner, Art Unit 2193

/Lewis A. Bullock, Jr./

Supervisory Patent Examiner, Art Unit 2193